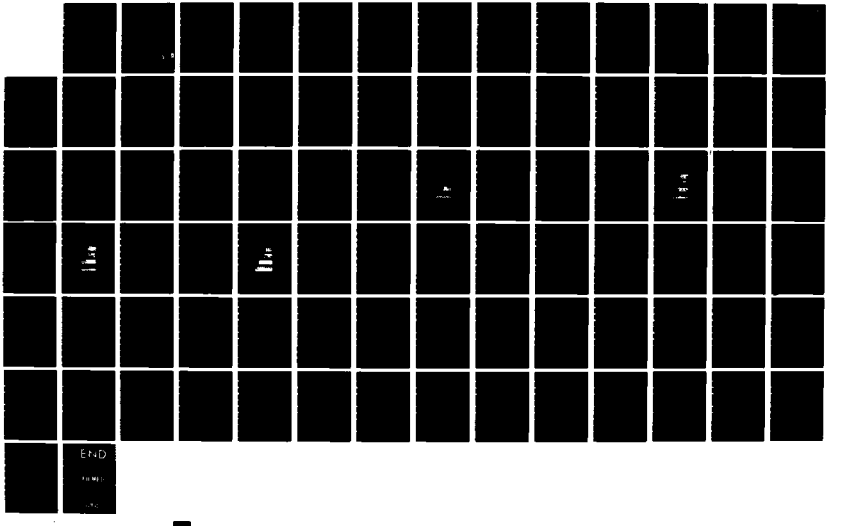
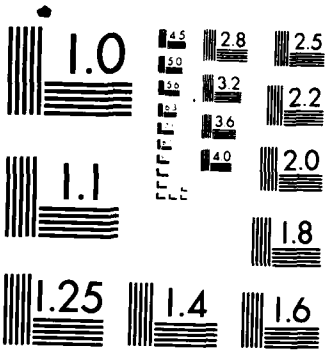
AD-A162 307 CONTRACTOR VS ORGANIC MAINTENANCE FOR SPACE COMMAND AUTOMATIC DATA PROCES (U) AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH SCHOOL OF SYST R E CHILDRESS

UNCLASSIFIED SEP 85 AFIT/GLM/LSM/85S-13 F/G 9/2 NL





CONTRACTOR VS ORGANIC MAINTENANCE FOR SPACE COMMAND AUTOMATIC DATA PROCESSING EQUIPMENT

THESIS

Robert E. Childress, Jr.
Major, USAF

AFIT/GLM/LSM/85S-13

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY
AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

2

AFIT/GLM/LSM/85S-13

CONTRACTOR VS ORGANIC MAINTENANCE FOR SPACE COMMAND AUTOMATIC DATA PROCESSING EQUIPMENT

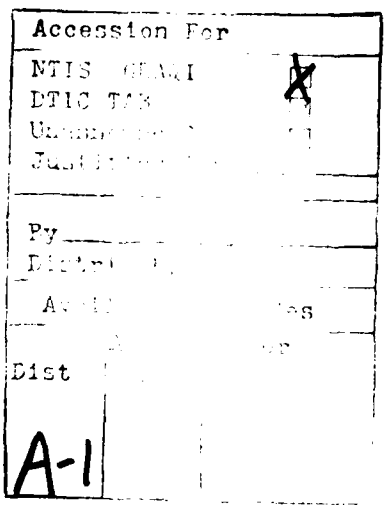
THESIS

Robert E. Childress, Jr.
Major, USAF

AFIT/GLM/LSM/85S-13

Approved for public release; distribution unlimited

The contents of the document are technically accurate, and no sensitive items, detrimental ideas, or deleterious information are contained therein. Furthermore, the views expressed in the document are those of the author(s) and do not necessarily reflect the views of the School of Systems and Logistics, the Air University, the United States Air Force, or the Department of Defense.



AFIT/GLM/LSM/85S-13

CONTRACTOR VS ORGANIC MAINTENANCE FOR SPACE COMMAND AUTOMATIC DATA PROCESSING EQUIPMENT

THESIS

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology
Air University
In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Logistics Management

Robert E. Childress, Jr., B.S., M.S.
Major, USAF

September 1985

Preface

This thesis is a contribution to Space Command as an additional part of the data base in the decision of selecting contractor or organic maintenance for newly acquired automatic data processing equipment.

The major article contributing to the thesis is prepared by Colonel Bockleman, SD/AL. That article specifically addresses costs involved in various combinations of organic and contractor maintenance.

There are three military personnel that contributed time and effort toward this thesis. I would like to thank my advisor, Major Rodney Byler, for his critiques and added material that were so beneficial toward completion. I would like to further thank Captain Bill Kelly and Colonel Dave Bockleman for taking time to discuss critical material with me.

Finally, I would like to thank my wife, Pam, for spending many hours reading and critiquing my writing.

Robert E. Childress, Jr.
Robert E. Childress, Jr., Major, USAF

Contents

List of Figures

List of Tables

List of Acronyms

ADCOM	Aerospace Defense Command Intelligence Upgrade
ADPE	Automatic Data Processing Equipment
AFLC	Air Force Logistics Command
AFB	Air Force Base
AFIT	Air Force Institute of Technology
AFQT	Armed Forces Qualification Test
AFR	Air Force Regulation
AFS	Air Force Station
AFSC	Air Force System Command
AIU	ADCOM Intelligence Upgrade
AL	Acquisition Logistician
ALC	Air Logistics Center
ASAT	Anti-satellite
ATC	Air Training Command
BES	Budget Estimate Submission
C^3	Command, Control, and Communications
CLS	Contractor Logistics Support
CMC	The Cheyenne Mountain Complex
CMRS	Calibration Measurements Requirements Summary
CPU	Central Processing Unit
CSOC	Consolidated Space Operations Center
CSS	Contractor Supply Support
DOD	Department of Defense
DSP	Defense Support Plan

FOC	Full Operational Capability
FY	Fiscal Year
GSA	General Services Administration
GPS/OCS	Global Positioning System Operational Control System
IBM	International Business Machines
ICS	Interim Contractor Support
IDHS	Intelligence Data Handling System
ILS	Integrated Logistics Support
IOC	Initial Operational Capability
LRU	Line Replaceable Unit
LSA	Logistics Suppport Analysis
MCC	Mission Control Center
MILSTAR	Not an acronym
NCMC	The Norad Cheyenne Mountain Complex
OI	Organizational and Intermediate maintenance
ORLA	Optimum Repair Level Analysis
PCS	Permanent Change of Station
PMD	Program Management Directive
PMEL	Air Force Precision Measurement Laboratory
SCF	Satelite Control Facility
SD	Space Division
SE	Support Equipment
SOC/NCS	Satellite Operations Complex and Network Control Segment
SPACECMD	Space Command
SPADOC	The Space Defense Operations Center
TDTC	Test, Development, and Training Center

Abstract

The primary purpose of this thesis is to provide the manager with considerations to be taken when making the decision whether to use civilian contractor or organic maintenance for off the shelf automatic data processing equipment. It is, specifically, designed around the equipment that is being installed for Space Command at The Norad Cheyenne Mountain Complex, Peterson AFB, and Falcon AFS in Colorado Springs, Colorado.

This thesis uses studies that have been done forecasting costs to provide information on one of the primary drivers of the decision to select a specific type of maintainence. In today's environment, cost has a tremendous effect on all governmental decisions. President Reagan is attempting to protect the military budget from cuts; however, military costs must be controlled. Consequently, cost discussion is the most significant issue in the thesis.

Cost consequences are signigicant, however, the most effective use of resources and accomplishment of the mission should be uppermost in the military manager's decision. Therefore, the thesis discusses advantages and disadvantages of organic and contractor maintenance. Also, a discussion of the acquisition of military personnel is included, should the decision be made to provide organic maintenance.

The conclusions drawn throughout the aspects discussed in the thesis are highly favorable toward contractor maintenance. Primarily, because costs are lower and personnel problems are less.

CONTRACTOR VS ORGANIC MAINTENANCE FOR SPACE COMMAND AUTOMATIC DATA PROCESSING EQUIPMENT

I. Introduction

"Power is meaningless in the absence of a doctrine for employing it."
Henry A. Kissinger,
April 1956

When the Government acquires systems, acquisition cost is only a small portion of the cost, when considering life cycle cost of owning equipment (24:Rastetter). Once the user has acquired equipment, the user is committed to the remaining part of the cost, a large portion of which is maintenance of the affected equipment.

Costs are a problem, but the acquired systems must do the job. The doctrine providing the basis for the goals is extremely important. Systems are created using the visualization provided by goals to allow for activities that encompass the job. If the wrong system is acquired, as a result of a poor policy, the real goal of the desired policy is not achieved.

Space Command is on the verge of installing new automatic data processing equipment (ADPE) in Colorado, at The Norad Cheyenne Mountain Complex (NCMC, sometimes referred to as CMC), Peterson AFB, and Falcon AFS (a new Air Force facility under construction). The Colorado Springs area will have a maintenance consolidation in several programs, such as:

1. The Space Defense Operations Center, Aerospace Defense Command (ADCOM) Intelligence Upgrade, and Anti-satellite (ASAT) Mission Control Center (SPADOC/AIU/MCC)
2. Global Positioning System Operational Control System (GPS/OCS)
3. Satellite Operations Complex and Network Control Segment (SOC/NCS)
4. MILSTAR
5. Test, Development, and Training Center (TDTC)
6. Defense Support Plan (DSP) (3:Bockleman)

For the purpose of discussion in this thesis, all of the above mentioned programs shall be referred to as the consolidated automatic data processing equipment (ADPE) program.

Consolidated maintenance will take advantage of equipment and software commonality to preclude maintenance resource duplication. The equipment will be the foundation for the Command, Control, and Communications (C^3) of the present and projected Air Force space programs. Table I indicates the amount of varied equipment involved in the overall consolidation.

The SPADOC portion of the equipment, listed in Table I, has an acquisition cost of $115 M, and is the largest acquisition cost of the programs listed in the table (3: Bockleman). As a consequence of today's economy, cost has become one of the most significant issues in all Air Force programs. AFR 800-11 states "Cost is a parameter equal in importance to technical performance, supportability, and schedule requirements" (9:1). Therefore, the cost of SPADOC, as well as the other programs, is of considerable significance to the Government.

TABLE I

IBM ADPE for Colorado Springs

	GPS/OCS	SOC/NCS	SPADOC	Total
Central Processor Units	2	10	15	27
Direct Access Storage Units	24	38	58	120
Magnetic Tape Units	24	24	42	90
Printers	4	34	37	75
Displays	8	244	39	291
Control Units	17	42	54	113
Other Units	4	7	53	64

This is the latest consolidation of ADPE briefed to AFALC on 22 February 1985. This data has been gathered and provided by Captain Bill Kelly, SD/ALFC.

During a presentation to AFLC, Mr. Greg Adams, Consolidated Space Operations Center (CSOC) Logistics Manager, stated that program funding is marginal and that an additional $32.1 M has been requested in the FY 86 Budget Estimate Submission (BES) in support of the CSOC (located at Falcon AFS) (1:1). CSOC contains most of the programs addressed in this thesis. Clearly, cost is a very important issue in the installation of ADPE at Colorado Springs.

Because the consolidated ADPE program is very costly, the problem exists of devising the most cost effective way of providing maintenance support to the ADPE to be installed in Colorado Springs. The most prominent issue, to affect cost of maintenance support, is the combination of organic (military and federal employees) and contractor maintenance.

Some basic definitions must be explained, before continuing this discussion, in order to create a better understanding of the topic.

Definitions

Organic refers to maintenance performed by the Air Force using government-owned or -controlled facilities, equipment, and military and/or civilian government personnel. Organic costs include civilian labor, material expenses, and overhead expense.

Contract maintenance is performed under contract by private, commercial organizations using contractor personnel and facilities or government-furnished material and facilities. Contract costs include payments to contractors and the dollar value of government-furnished material provided to contractors (11:3).

Three terms are used to describe the basic types of maintenance structure: organizational, intermediate, and depot.

Organizational maintenance is maintenance that is performed at the location of the failed unit. Typically, it is the removal and replacement of a line replaceable unit (LRU). It involves the day to day servicing, lubricating, and adjusting of on-equipment units. The least specialized personnel work in organizational maintenance using the least specialized equipment. Organizational maintenance is the lowest level of the maintenance structure (17:11).

Intermediate maintenance is maintenance that is performed on units that have been removed from on-equipment assemblies. These are taken to a nearby shop and repaired if possible. Intermediate maintenance is performed with more specialized personnel and repair equipment. Intermediate maintenance is the middle level of the maintenance structure (17:13).

Depot maintenance is done by the most skilled personnel and with the most complicated repair equipment. It is not performed at the site and, usually, requires more sophisticated parts. Depot maintenace is considered the highest level of the maintenance structure (17:14).

Consolidated maintenance will: manage all maintenance for the combined systems, interface with external maintenance organizations, manage trained maintenance personnel for both hardware and software activities, manage obtaining and updating of applicable maintenance data, reports, and anything else, that affects day to day maintenance activities (17:11).

Another definition, that is peculiar to this thesis, is that of **field level**

maintenance. The three levels of maintenance (i.e. organizational, intermediate, and depot) will be discussed as a two level maintenance. Field level maintenance has organizational and intermediate maintenance combined (3: Bockleman).

Background

This thesis will address ten-year (based on typical life of electronic components (11:2)) maintenance costs of various combinations of organic and contractor maintenance at organizational, intermediate, and depot level for the combined ADPE program. The ramifications, of these combinations, will also be discussed. There are three studies that are the basis of the literature review. They are done by ARINC Corporation, the ALC, and IBM.

ARINC Corporation

The first study, completed by ARINC Corporation in 1984, addresses the Global Positioning System Operational Control System (GPS/OCS) automatic data processing equipment (ADPE). The purpose of the study is to: develop an organic maintenance cost estimate, identify resources, quantify cost elements, conduct analysis, and present results (28:1-2). This study applies solely to the GPS/OCS and is limited to International Business Machines (IBM) equipment. The initial and recurring costs are in 1984 dollars for the period 1987-1992 (28:1). Cost elements are as follows:

1. Direct Maintenance Personnel Acquisition
2. Pay and Allowances
3. Replenishment Spares
4. IBM Change and Modification Data
5. Depot Maintenance
6. Initial Spares and Repair Parts
7. Provisioning Documentation
8. Maintenance Training
9. Peculiar Support Equipment Acquisition
10. Peculiar Support Equipment Maintenance (28:3)

Furthermore, the ARINC study uses several assumptions in evaluating training costs for organic maintenance. These are:

1. AFSC 305X4 personnel will require Type I training [special training provided by the contractor]
2. IBM would provide *course(s)*
3. IBM 3033 would be provided [by the Air Force]
4. Lowry TTC IBM 3033 [would require] course limitation of 12 students per year
5. Additional training course [would be] required to increase AFSC 305X4 IBM 3033 training for GPS/OCS (28:8)

Thus, the ARINC study concluded that the initial cost of providing organic maintenance for the GPS/OCS is $2,891,000. Recurring costs are $1,250,000 per year. The major cost elements are pay/allowances, spares replenishment, and training. Significant cost drivers are personnel quantities and IBM 3033 training availability. Since IBM has phased out the 3033, the Air Force provides the single source of training for this computer (28:11).

ALC Study

A second study, which considers this problem area, is the "Support Options Study: IBM Commercial ADPE for Colorado Springs." This more encompassing study emphasizes organic and contractor costs. The data provided includes GPS/OCS, SOC/NCS, and SPADOC/AIU/MCC. Furthermore, it discusses costs at all three levels of maintenance (organizational, intermediate, and depot).

While this study does not draw conclusions, it provides cost figures and an upper-level breakdown of those figures. The study was presented by Col Dave Bockleman, SD/AL, to AFALC on 22 February 1985. The study Col Bockleman presented is the most important of the three studies. Consequently, it will be discussed in more detail in Chapter II. It will be the prime driver in the decision of organic/contractor mixture in the maintenance support of the ADPE (3: Bockleman).

IBM Corporation

The final study has been made by the IBM corporation. Their study had the objective of "Assist Air Force in establishing the most cost effective maintenance of IBM commercial computer hardware in the Colorado Springs area" (2:2). This objective is somewhat misleading in that it covers only two programs, Satellite Operations Complex and Network Control Segment (SOC/NCS) and Defense Support Plan (DSP). The study performed by IBM provides a non-recurring organic cost estimate that includes maintenance

training, training equipment, initial spare parts, Integrated Logistics Support (ILS) planning, and provisioning data. The totals are $12,413,700 for SOC/NCS and $8,785,896 for DSP. The recurring costs include four Air Force instructors at $50,000/year, 20 maintenance personnel at $40,000/year, and spares replenishment at $900,000/year for SOC/NCS. The total recurring cost comes to $1,900,000/year for SOC/NCS and $1,850,000 for DSP. The bottom line is that the IBM maintenance figure for continuous maintenance availability per year is $1,173,000 for SOC/NCS and $926,112 for DSP (2:15).

IBM points out that their product support system will provide:

1. Manage to customer's availability
2. Predictive vs remedial maintenance
3. Sophisticated diagnostics
4. Established parts inventory management system
5. Second and third level support
6. No obsolescence due to engineering changes
7. Fast response
8. Low turnover of personnel (2:18)

IBM's major cost avoidance items would be:

1. Training & training equipment
2. Support equipment
3. Integrated Logistics Support effort
4. Spares inventory/warehousing (2:19)

In conclusion, IBM states that contractor maintenance is better because:

1. Integrated product support system already in place
2. Air Force can advance with technology improvements more readily
3. More cost effective (2:20)

Scope and Limitations

Scope. The overall effects of the consolidated ADPE program can have cost implications throughout the Air Force. The Air Force wide implications, however, are far beyond intentions of this thesis. Boundaries are important, because the size of the thesis discussion could become enormous and adequate coverage could not be made of any of the effected topics. Therefore, it is necessary to establish boundaries on the discussion. Relevant boundaries include time, military command, and data availability.

The boundary of time appears in several forms. It is a period of ten years, maintenance is performed on a 24 hour day/ 7 days per week, and dollars are in 1984 dollars.

Another approach, to the time boundary, is that programs considered in this thesis do not start at the same time. The milestones for all the programs are continually changing with the advent of political, economical, technical, and social factors. Consequently, realistic program time initiation points cannot be handled with true discretion. Therefore, the most effective way to compare program information is to approach it as though all the programs are operational and have reached steady state.

The military commands that are affected most must act as a boundary. Maintenance training is a logistics planning consideration that threads between commmands. Lowry AFB, under the auspices of Air Training

Command (ATC), is the center for ADPE training for Air Force personnel. Space Command (SPACECMD), under organic requirements, requires ADPE maintenance personnel acquired through ATC. However, the consideration of ATC in this thesis will be of number of personnel. SPACECMD and ATC make up the command boundary.

A boundary of data availability beyond the control of the author has been placed on one of the programs that is involved in the overall project. That program is the DSP, for which there is limited information due to the program's security classification. The only information available is that presented by IBM in the "Maintenance of IBM Commercial Computer Hardware in the Colorado Springs Area." That is, the non-recurring costs and the recurring maintenance cost of the DSP.

Limitations. The most significant hurdle will be to obtain all of the pertinent data. All of the existing studies cannot be easily obtained and must be searched out. Another hindrance to acquiring data is the fact that the studies are at this time under construction or in final stages of construction. Furthermore, an important contributor to information, IBM, has refused to cooperate, directly, with the author. IBM information will be that which has already been provided to working logisticians. Consequently, it is possible that an important part of the thesis information could be unavailable.

Distance is another problem, separating all of the studies being performed, including this one. Studies are in progress in Southern California, Northern California, Colorado, Ohio, and Maryland. Personal

communication and acquisition of data are complicated by this problem.

Research Objectives

This thesis has the singular purpose of performing applied research for a managerial decision to select the optimum maintenance of ADPE at the least possible cost. Cost is the most important part of the decision, but numbers do not always reveal the true character of the problem. Thus the manager must weigh information and make the selection of what is truly optimum. Therefore, this thesis will go beyond the solid information that can be gained through consideration of quantitative data and present a discussion of the advantages of combinations of organic and contractor maintenance.

Methodology

General Issue. Logistics has become one of the most important issues in the Government today. Much attention has been placed on logistics because of incidences such as: locating the F-4 jet fighter command radio beneath the aircraft ejection seat and the helicopter failures in the raid on Teheran, Iran. These incidences demonstrate effects of logistics on Government costs and results (24:Rastetter).

Specific Problem. The specific problem is to devise the most cost effective way of providing the optimum maintenance support to the ADPE to be installed in Colorado Springs, Colorado. The most fundamental consideration to affect maintenance cost is whether to use contractor or

organic maintenance. Cost is important, but issues which effect the accomplishment of the mission must also be considered. Such issues are: responsiveness of maintenance; technology transfer; rapid advancement of technology; personnel cuts; training of personnel; dependence on the commercial industry; lines of authority; sophistication of personnel; and so on.

Guiding Statements. The author will gather completed studies on the topic, and organize them into a thesis format. Step one, he will provide additional data from Air Force manuals and regulations. Step two, he will explain the data and attempt to add insights. This is called cause and effect method of development. Cause and effect method of development means that the data is presented to explain why something is true or not true as a consequence of internal or external conditions. The object is to show a relationship between an internal and/or external environment which establishes a plausable explanation about why a condition is true or false. All the facts must be relevant to the topic. Step three, the conclusion must be supported by the evidence of the relevant facts. The facts that are gathered must be adequate to support the conclusions. Facts that are gathered can be slanted, so there must be an unbiased collection process used by the researcher. Relationships must be demonstrated using these pertinent and arguments. It must be demonstrated that the presence of one fact has a relationship with the presence of another fact beyond any doubt. Sometimes one fact is a consequence of a combination of many facts and this must be considered (4:80-81). At the completion of the steps, the

manager, acting on the behalf of the user, should have a clear picture of the problem and possibly a good indication of what the solution should be.

Particular Method. The general method used to approach the problem is to first gather important studies that have, thus far, been completed about the topic. Then, expand all the information from these studies using Air Force regulations and manuals. Finally, extrapolate and make plausable conclusions from the data. The next chapter will discuss the most important study completed thus far; the data gathered by Colonel Bockleman which he presented to ALC in February 1984.

II. Cost Comparisons

Introduction

The problem exists of devising the most cost effective way of providing maintenance support to the automatic data processing equipment to be installed in Colorado. Colonel Bockleman, SD/AL, has coordinated a study requested by AFALC to address this problem. Colonel Bockleman used the study by ARINC Research as a stepping stone for his efforts.

Defintitions

The following definitions will aid in understanding the data presented:

It [**organizational** maintenance (direct,on equipment),which is performed on installed equipment] consists of inspecting, servicing, lubricating, adjusting, system/equipment fault diagnosis and isolation to a failed Line Replaceable Unit (LRU), removal and replacement of LRU's, and verification of system equipment. This maintenance will be performed at the location of the failed items/equipment (17:11).

It [**intermediate** maintenance (direct, off-equipment), which is performed on installed equipment] consists of calibration, alignment, repair by replacement of damaged or serviceable parts, components or assemblies, or dispositon of an LRU to a higher level repair. This maintenance will be performed at the repair facility on-site or at an alternate location (e.g. Peterson AFB). It consists primarily of repairing and verifying the LRUs removed during on-equipment maintenance and will be performed on a limited basis at NCMC to minimize aditional manpower, facilities, and test equipment requirements (17:13).

Depot maintenance (indirect, off-equipment) provides more extensive shop facilities, equipment and personnel of higher technical skill than normally available to lower levels of maintenance. It consists of repairing, modifying, overhauling, reclaiming, and rebuilding parts and providing technical asistance to using activities and lower maintenance level organizations. This category of maintenance wil be performed at military depots, contractor facilities, or on-site by dispatch of specialists with parts, materiel, and tools to perform this level of work. Contract support, where required, will be provided by equipment manufacturers or other qualified contractors as determined by the government (17:14).

Assumptions

The most prominent issue to affect cost of maintenance support is the combination of organic (military and federal employees) and contractor maintenance. Colonel Bockleman separates his study into four programs: ORGANIC (without maintenance consolidation), in which all three levels of maintenance are performed by organic maintenance; CON/ORG (consolidated organic maintenance) in which all three levels of maintenance are performed by organic maintenance; COR/CSS (consolidated organic maintenance with CSS) organizational and intermediate maintenance (field maintenance) with depot provided by contractor; and CLS in which all maintenance is performed by contractor (3: Bockleman).

Col Bockleman's study does not specifically address TDTC, MILSTAR, and DSP. TDTC cost has been absorbed as sub-categories of portions of his study and is evaluated, but not under the title of TDTC. MILSTAR is not covered

because it is made up of VAX equipment. DSP is classified and would only effect the study as a sunk cost (3: Bockleman). Furthermore Col Bockleman's study makes the following assumptions:

1. Consolidated efficiencies to be realized by both the USAF and a contractor:
   - Spares
   - Data
   - Manpower
   - Support Equipment
   - Training
2. Ten year system life cycle.
3. ATC funds/conducts training for bluesuits (initially Type I, then ATC will follow on). Contractor provides own training.
4. Initial data will be the same if the equipment is the same.
5. Manpower: Assume 38 bluesuiters (total) for SOC/NCS, GPS, SPADOC.
6. Support Equipment would not be shared by CMC, Falcon AFS, TDTC (each has own set). PMEL support will be provided by Peterson AFB.
7. Spares will be stored at a central warehouse on Peterson AFB with supply points at CMC and Falcon AFS.
8. The short form will be used for provisioning for the organic case. Level 1 drawings will be sufficient, (per Warner Robins ALC).
9. "Contractor dictated" configuration will be used for commercial ADPE (with certain management exceptions) in all cases. Data subscriptions will be required.
10. Bluesuit O/I [organizational and intermediate] maintenance costs are the same for Organic and Organic with Contractor Supply Support (CSS).
11. Logistics Suppport Analysis (organic case) costs will be allocated among the various outputs it gives rather than as a lump sum "LSA cost".

12. Military Personnel turnover rate stabilizes at 33%/year, i.e., yr. 1-0%, yr. 2-16%, all subsequent yrs. 33%.
13. The data needed to recompete the maintenance contracts is included in the cost of all options (3:Bockleman).

Data

Colonel Bocklman briefed his conclusions at a meeting with the AFALC/CC on 22 February 1985. The results are shown in Tables II, III, and IV. Graphical representation is in Figures 1, 2, 3, and 4.

TABLE II

PROGRAM: GPS/OCS
FY84 $(in millions)

	ORGANIC	CON/ORG	COR/CSS	CLS
I. Unit Maint. Personnel	4.69	2.92	2.92	.00
II. Initial Investments				
A.TECH Orders	.06	.06	.06	.00
B. Initial Spares	.24	.24	.00	.00
C. Support Equipment	.20	.20	.20	.00
D. Provisioning Data	.32	.32	.00	.00
E. Engineering Data	.00	.00	.00	.00
F. CMRS	.28	.28	.28	.00
G. ORLA	.00	.00	.00	.00
H. ILS Plng/Mgnt	.75	.56	.38	.00
SUBTOTALS	1.85	1.66	.92	.00
III. Depot Level Maintenance				
A. Component Repair	.21	.21	.00	.00
B. Support Equipment	3.00	.00	.00	.00
C. Software	2.00	1.00	.00	.00
D. Data	2.50	.50	.00	.00
E. Engineering Data	1.00	.50	.00	.00
F. Training	.30	.03	.00	.00
G. Subscription Service	.01	.01	.00	.00
H. Modifications	.06	.06	.00	.00
I. Contract Cost	.00	.00	1.95	4.33
SUBTOTALS	9.08	2.31	1.95	4.33
IV. Sustaining Investment				
A. Replenishment Spares	.28	.28	.00	.00

TABLE II (cont'd)

B. Replacement SE	.40	.40	.40	.00
C. Data Subscription	.08	.08	.08	.00
SUBTOTALS	.76	.76	.48	.00
V. Depot Non-maintenance	.01	.01	.00	.00
VI. Personnel Acq. & Training				
A. Init. Acquisition	.32	.22	.22	.00
B. Initial Training	.88	.60	.60	.00
C. Recurring Acq. & Training	3.98	2.70	2.70	.00
SUBTOTALS	5.18	3.51	3.51	.00
VII. Installation Support Personnel	.70	.44	.44	.00
TOTALS	**22.27**	**11.62**	**10.22**	**4.33**

GPS/OCS

CSOC will incorporate the GPS Master Control Station (MCS) and Monitor Station (MS). Vandenberg AFB presently has an MCS operating as an Interim Control Station. It uses a commercial off the shelf (COTS) IBM 3033N12 and peripherials. At this time the equipment is to be maintained by the prime contractor as part of the acquisition contract. "Newly-developed equipment will be maintained (per user direction - GPS Ops Concept, SPACECMD/XPSS, 1 Aug 84) by AFCC military personnel." The costs offered in this study are

quoted as of the end of the acquisition contract which will terminate 31 Mar 87 (3:Bockleman).

PMD requires that COTS ADPE be maintained by the least costly method. On 21 Nov 84 a trade study was completed and recommendations sent to HQ USAF. The study shows, as indicated in Table II and Figure 1 that the **most cost effective maintenance method for maintaining COTS ADPE is by CLS** (3:Bockleman).

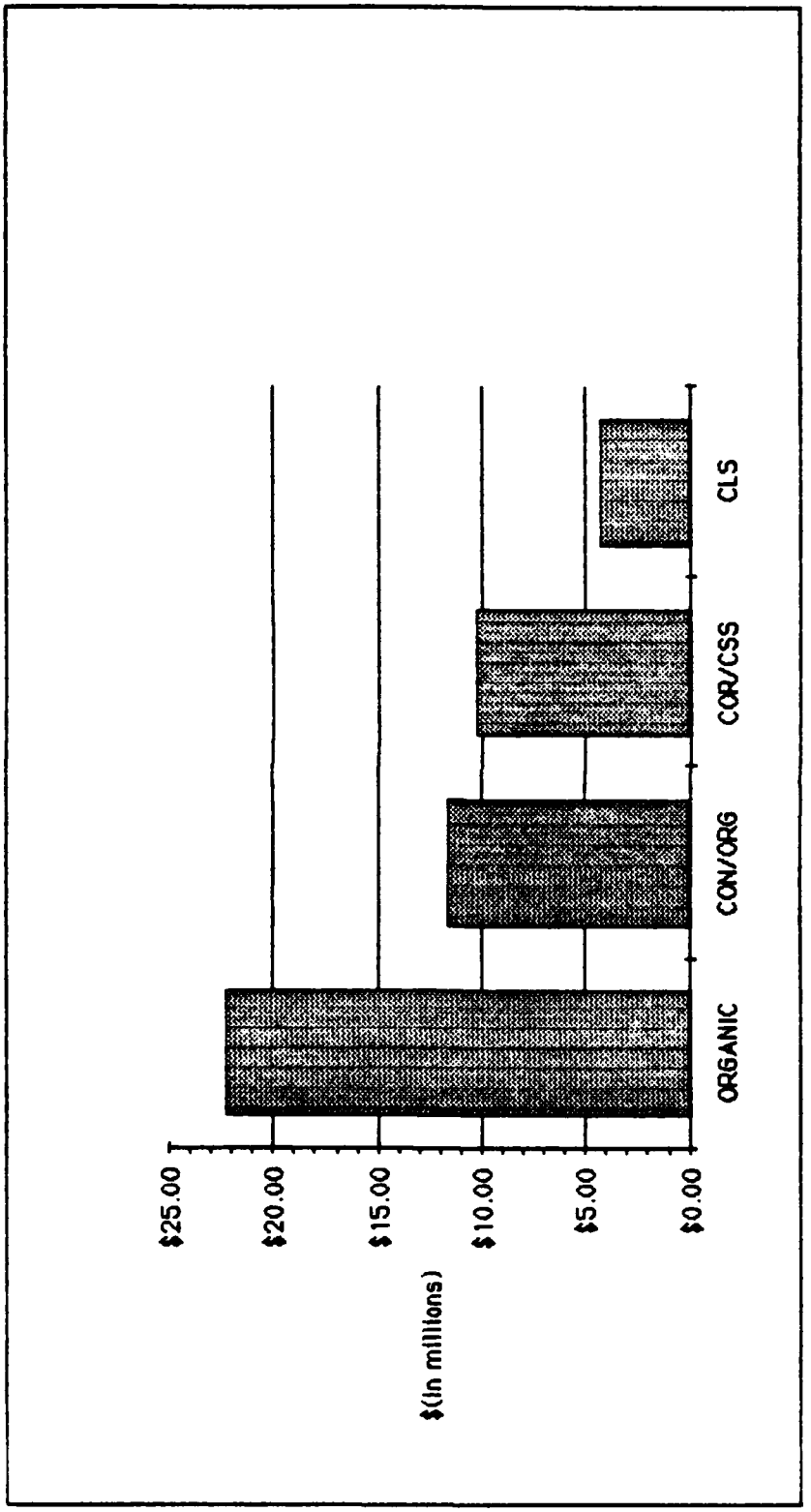


Figure 1. GPS/OCS

TABLE III

PROGRAM: SOC/NCS
FY84 $(in millions)

	ORGANIC	CON/ORG	COR/CSS	CLS
I. Unit Maint. Personnel	4.32	3.19	3.19	.00
II. Initial Investments				
A.TECH Orders	.86	.86	.86	.28
B. Initial Spares	1.76	.00	.18	.18
C. Support Equipment	1.10	1.10	1.10	.11
D. Provisioning Data	1.76	1.76	.67	.67
E. Engineering Data	.00	.00	.00	.00
F. CMRS	.28	.28	.28	.03
G. ORLA	.06	.06	.06	.06
H. ILS Plng/Mgnt	.75	.56	.38	.07
SUBTOTALS	6.57	4.62	3.53	1.40
III. Depot Level Maintenance				
A. Component Repair	.90	.90	.09	.09
B. Support Equipment	3.00	1.00	.30	.30
C. Software	2.00	1.50	.20	.20
D. Data	2.50	1.50	.25	.25
E. Engineering Data	1.00	.10	.10	.10
F. Training	.03	.03	.00	.00
G. Subscription Service	.03	.03	.00	.00
H. Modifications	.27	.27	.03	.03
I. Contract Cost	.00	.00	4.47	11.04
SUBTOTALS	9.73	5.33	5.44	12.01
IV. Sustaining Investment				
A. Replenishment Spares	1.54	1.54	.15	.15

TABLE III (cont'd)

B. Replacement SE	2.20	2.20	2.20	.22
C. Data Subscription	.08	.08	.08	.01
SUBTOTALS	3.82	3.82	2.43	.38
V. Depot Non-maintenance	.03	.03	.00	.00
VI. Personnel Acq. & Training				
A. Init. Acquisition	.32	.22	.22	.00
B. Initial Training	.86	.58	.58	.00
C. Recurring Acq. & Training	2.02	1.37	1.37	.00
SUBTOTALS	3.20	2.17	2.17	.00
VII. Installation Support Personnel	.65	.48	.48	.00
TOTALS	**28.32**	**19.64**	**17.14**	**13.79**

SOC/NCS

Life Cycle Costs (LCC) for SOC/NCS for alternative maintenance costs are presented in Table III and Figure 2. Development and support costs for SOC/NCS are minimized by direction of the CSOC PMD to use COTS ADPE. All of the data in this study is prepared to evaluate the best mix of "blue suit" and contract maintainers for SOC/NCS. At this time, the CSOC manpower package is not supportive of any organic maintainence for SOC/NCS, with the exception of the CSOC communications (3:Bockleman).

This portion of the study is indicative of the equipment combination used by SOC/NCS. The equipment is 90% IBM and 10% Harris COTS. There are 9 large mainframes associated with the IBM equipment. The value of of the hardware is approximately $22M. October 1988 is the time frame for the beginning of costs shown in this study. Data has been requested for competitive contractor support. The results of this study has clearly shown that **the most cost effective method for maintaining COTS ADPE is CLS** (3:Bockleman).

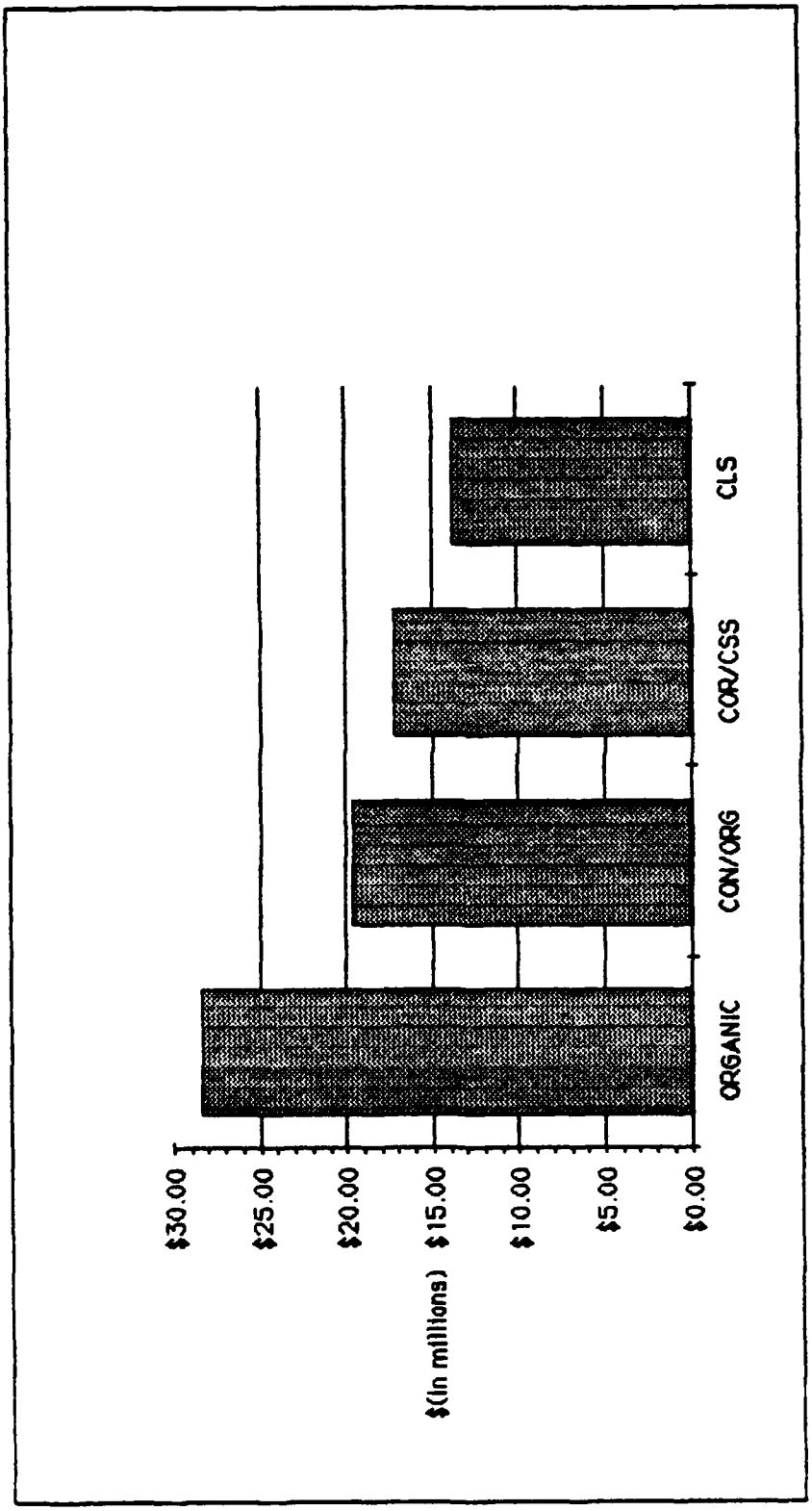


Figure 2. SOC/NCS

TABLE IV

PROGRAM: SPADOC/AIU/MCC
FY84 $(in millions)

	ORGANIC	CON/ORG	COR/CSS	CLS
I. Unit Maint. Personnel	1.96	1.33	1.33	.00
II. Initial Investments				
A.TECH Orders	1.23	1.23	1.23	.00
B. Initial Spares	9.21	9.21	3.48	.00
C. Support Equipment	.54	.54	.54	.00
D. Provisioning Data	.98	.98	.48	.00
E. Engineering Data	.00	.00	.00	.00
F. CMRS	.29	.29	.29	.00
G. ORLA	.00	.00	.00	.00
H. ILS Plng/Mgnt	2.07	1.56	1.04	.00
SUBTOTALS	14.34	13.82	7.06	.00
III. Depot Level Maintenance				
A. Component Repair	.36	.36	.00	.00
B. Support Equipment	3.11	3.11	.00	.00
C. Software	2.07	2.07	.00	.00
D. Data	2.59	2.59	.00	.00
E. Engineering Data	1.04	1.04	.00	.00
F. Training	.03	.03	.00	.00
G. Subscription Service	.10	.10	.10	.00
H. Modifications	.10	.10	.10	.00
I. Contract Cost	.00	.00	9.27	20.59
SUBTOTALS	9.40	9.40	9.47	20.59
IV. Sustaining Investment				
A. Replenishment Spares	8.40	8.40	.00	.00
B. Replacement SE	1.08	1.08	1.08	.00
C. Data Subscription	.08	.08	.08	.00

TABLE IV (cont'd)

SUBTOTALS	9.56	9.56	1.16	.00
V. Depot Non-maintenance	.01	.01	.00	.00
VI. Personnel Acq. & Training				
A. Init. Acquisition	.15	.10	.10	.00
B. Initial Training	.37	.25	.25	.00
C. Recurring Acq. & Training	1.37	.93	.93	.00
SUBTOTALS	1.89	1.28	1.28	.00
VII. Installation Support Personnel	.29	.20	.20	.00
TOTALS	**37.45**	**35.60**	**20.50**	**20.59**

SPADOC/AIU/MCC

The SPADOC/AIU/MCC program is located in the Cheyenne Mountain Complex (CMC) as opposed to being at the CSOC. The SPADOC/AIU/MCC are combined as a result of hardware and software commonality. The three programs wil use the the same central processors (IBM 3083), peripherals, and small computers (3:Bockleman).

PMD has directed "blue suit" maintenance for SPADOC. However, AIU is "expected to be contractor maintained." The AIU could use SPADOC support, but presently "has no logistics support direction." MCC had not been funded as of the date of the Bockleman study. However, it could also use SPADOC support planning (3:Bockleman).

SPADOC contract calls for initial contractor operations and maintenance contractor support. SPADOC will have the option of extending continued support beyond the FOC. Presently Interim Contractor Support (ICS) is planned until Jul 1988. Costs outlined in this study begin Aug 1988. The costs indicate for SPADOC/AIU/MCC **the most cost effective method for maintaining COTS ADPE is COR/CSS BY $90,000** (3:Buckleman).

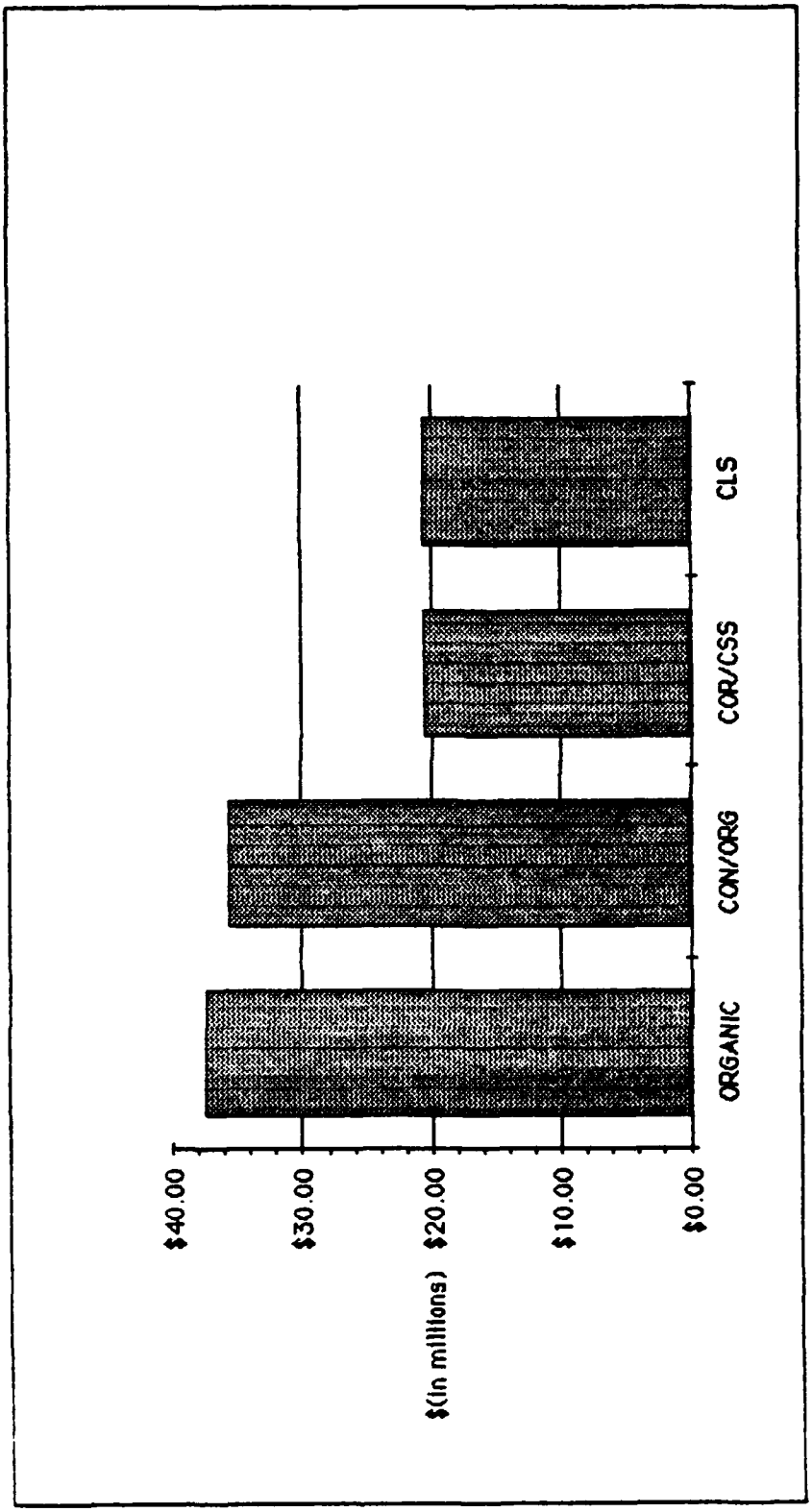


Figure 3. SPADOC/AIU/MCC

Conclusions

In all combinations of organic and contractor maintenance, only one combination resulted in an organic combination being more cost effective than CLS. The COR/CSS for SPADOC/AIU/MCC is $90,000 lower than CLS. The next closest to CLS is SOC/NCS in COR/CSS. It is, approximately, $3.5 M more than the CLS. The remaining costs demonstrate that in each program, GPS/OCS, SOC/NCS, and SPADOC/AIU/MCC, organic combinations range roughly from twice to four time that of CLS. Where Col Bockleman's study covers the same programs as the IBM study there is a common conclusion that contractor maintenance is more cost effective. The totals of all the programs are indicated below in FY84 dollars. A chart demonstrating those dollars is displayed in Figure 4.

	ORGANIC	CON/ORG	COR/CSS	CLS
GRAND TOTALS ($Millions)	**88.01**	**68.80**	**48.81**	**38.71**

In Col Bockleman's study, 54 maintenance personnel were essential for a consolidated maintenance program. Space Command stated, that the maintenance can be done with 38 personnel. To keep the study conservative, Col Bockleman uses Space Command's requirement of 38 personnel (3:Bockleman).

The ARINC study points out that the most significant maintenance cost is personnel. A discussion of organic personnel follows in Chapter IV. With the consideration that the number of personnel is a conservative figure, the total cost in which organic maintenance is involved will only increase

proportionately with personnel increases. Therefore, if the decision of which combination of ADPE maintenance is best is based on cost alone, CLS must be selected.

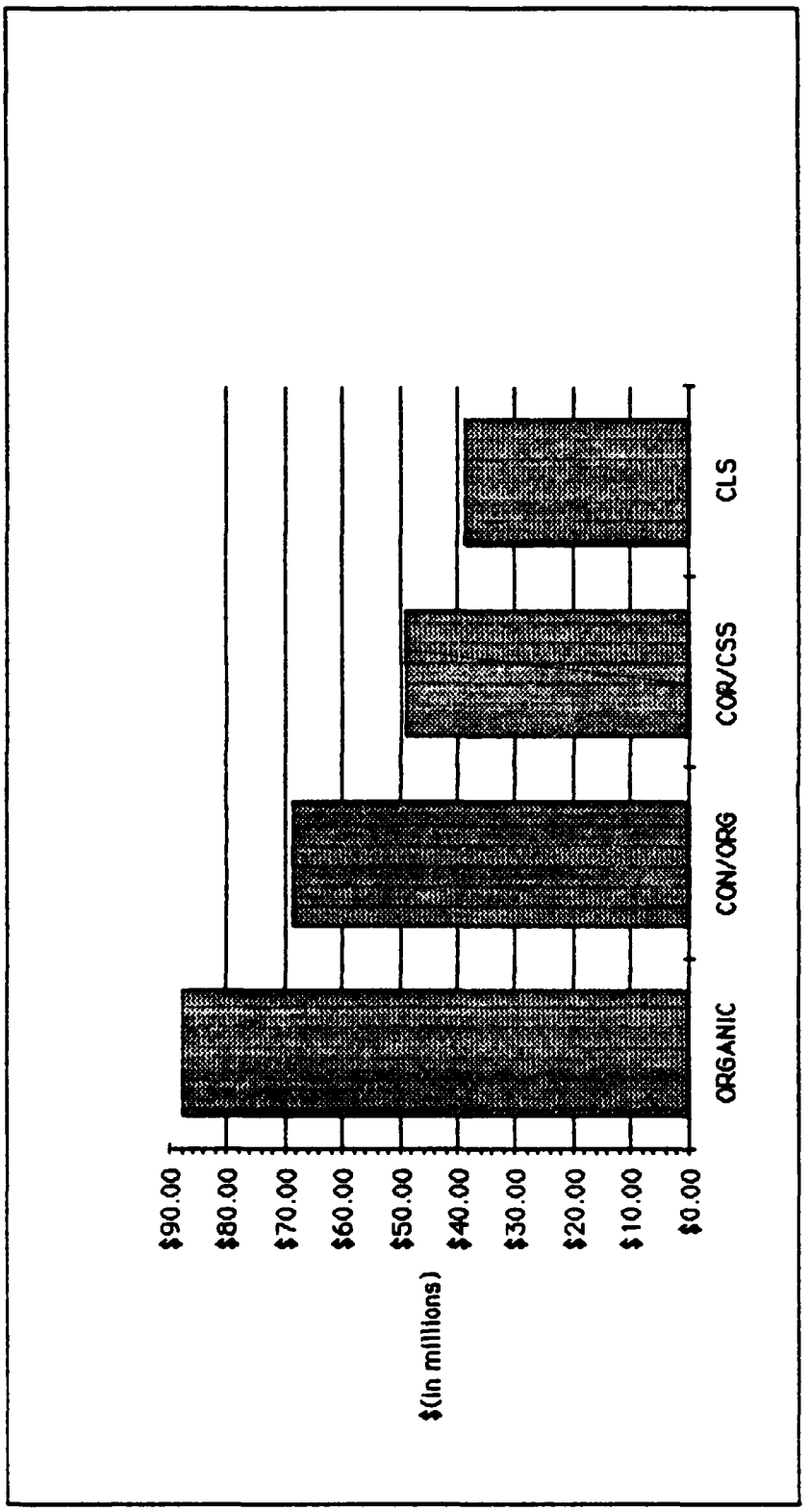


Figure 4. Total

III. Ramifications of Contractor and Organic Maintenance

Introduction

The goal of equipment maintenance is to maintain equipment at the least possible cost (12:2). To achieve this, it is essential that management perform a detailed analysis of the maintenance costs. An important consideration, when doing this, is the balancing of organic and contractor maintenance.

To achieve a balance, decisions must be made regarding tradeoffs of gains and losses with the use of either organic or contractor maintenance (10:1). Furthermore, these gains or losses will involve tangible and intangible factors that may possibly outweigh cost. Some examples would be the effect of war, periodic contractor recompetition, and so on.

First, this chapter will address advantages and disadvantages of organic maintenance followed by those of contractor. Next, a discussion of Interim Contractor Support (ICS) will be given.

Organic Maintenance

The discussion on organic maintenance should begin with statements from AFR 66-14 on equipment maintenance policies, objectives, and responsibilities. It states the following general policies for the use of organic maintenance:

> Agencies must set up organic maintenance support if one or more of the following conditions exist:

1. Procurement of a product or service from a commercial source would disrupt or materially delay a program.

2. A satisfactory source is not available and one cannot be developed in time to provide a product or service when it is needed.

3. The product or service is not available from another Federal agency nor from commercial sources.

4. Procurement of the product or service is from a commercial source which will result in higher total cost to the Government.

5. It is necessary for the Government to perform a commercial or industrial activity for the purpose of combat support or for individual unit retraining of military personnel or to maintain or strengthen mobilization readiness (12:2).

Organic maintenance may be defined as "Maintenance performed by the Air Force using Air Force-owned or controlled facilities, tools, test equipment, spares, repair parts, and personnel" (12:13). Simply stated, organic maintenance is maintenance performed by military or civil service personnel using Government owned equipment. A discussion of advantages and disadvantages of organic maintenance follows.

Advantages. The most prominent factor in favor of organic maintenance is the assured responsiveness of the "blue suiter" in a crisis. The command concerned will have greater "on-site" functional control and would not be effected by labor strikes or company dissolution. In the years following system acquisition, the user will have the certainty of continued support,

whereas the contractor will provide uncertainty.

Technological improvements in government technical capabilities will transfer to other areas using organic maintenance. Numerous organic repair capabilities already exist in the Government (5: Byler). Training for maintenance of a system that does not absolutely need to be organic can be transferred to like systems which, by wartime requirements, must be organic. This is particularly true, since common automatic data processing equipment is used wherever possible (10:1).

Disadvantages. Manpower packages will have to be expanded to include additional "blue suiters." It is not likely, that congress will increase manpower to cover additional maintenance requirements. With the funding cuts that appear annually and the necessity to oblige contractual commitments, historically "these cuts are levied on the organically maintained activities" (18:6).

Major General T. Smith, AFALC/CC, states that the AFLC supply system is strained. The added load of organic supply would result in poor supply accomodation (18:6). Cannibilization, a common form of supply on the flight line, is one of the consequences of poor supply accomodation. It would be unusual for cannibilization to be effective in ADPE. The result of a poor supply system would be the loss of the system at critical periods.

Training and training equipment must be established and purchased to be combined with existing Government inventories. Support for personnel and equipment must expand with it, to include technical documentation, spares procurement, and facilities.

Establishing and continuing, such training and training equipment,

exposes the Government to the risk of obsolescence or modification. Furthermore, lead time for changes could be considerable. In the second month of writing this chapter, IBM released to the market a new central processing unit that has twice the capability of any of the existing IBM central processor units. This emphasizes the rapid movement of technology, specifically automatic data processsing equipment (ADPE) (2:19; 10:1).

The act of training military personnel, in sophisticated ADPE, causes personnel loss. Once an individual is confident in this type of technology his skills become marketable. He can, more than likely, acquire a lucrative occupation within civilian industry at completion of his duty with the military. Consequently, the Government is burdened with the cost of retraining a replacement (3: Bockleman). Another way to look at this, is that the individuals that are not up to the standards of the civilian industry will remain in the military. Either of these effects are detrimental to Government personnel in cost and quality. The details of these aspects are discussed in Chapter IV.

Another fault in using organic maintenance is that there is always the chance of a new problem. Rapidly changing technologies yield new insiduous equipment problems that have been worked out on older equipment. These older problems can be discussed and manipulated in the classroom. The occurrence of something entirely new would cause considerable puzzlement to individuals not involved in the development of the system. A complete crash of the system would leave the organic maintenance person helpless (20:Machabee).

Contractor Maintenance

Contract maintenance is "the maintenance of material performed by commercial organizations (including prime contractors) on a one time or continuing basis" (12:12). "Contractor Logistics Support (CLS) is a method for providing all or part of a system's logistics support by contract throughout its entire life cycle" (8:2). Government policy is to depend on commercial and industrial products. This would seem to lead, naturally, to the same dependence on maintenance support for those items (13:7). A discussion of the advantages and disadvantages of contractor maintenance follows.

Advantages. The main reason for use of contractor support is that automatic data processing equipment is on the leading edge of technology. Using contractor support, decreases the need for "investing resources to acquire technical data, equipment, facilities and the associated training of personnel" to keep pace with rapidly advancing technology (5: Byler).

Continuity, which is gained by continuing personnel over long periods of time, encourages the implementation of corporate memory. Corporate memory is the gaining of experience and knowledge of a particular system, which can be made, only, by continuous use of a particular system. Knowledge and capabilities of maintenance personnel, under this condition, would be far superior to those who are constantly being moved about.

The lines of authority are clearly represented, when only one source is responsible (5: Byler). That is, if contractor maintenance is used throughout the maintenance system, particularly a single contractor, responsibilities are clear. This relieves the confusion generated by coordinating different

contractors or contractor/organic mixture.

Another advantage of contractor maintenance is that of paperwork. The government is noted for generating enormous amounts of paperwork in most of the activities it pursues. This is a cost which is underground, always tends to grow, and cannot always be clearly attached to cost estimates. Government employees always tend to require specialized paperwork for their department. Since it is extremely tough to remove this natural generation of paperwork, the easy answer is to allow the contractor control of an affected system. Thus, the natural tendency of government bureaucracy is bypassed (20:Machabee).

The act of using contractor maintenance will directly affect costs that presently exist. The costs discussed in Chapter II show CLS generally as being the lower cost. Competition, *a prime reason for* using contractors, would have a strong efffect on the costs. At the Air Force Institute of Technology (AFIT) competition of contractor maintenance for ADPE has driven the cost down 45%. Not only does CLS have the overall lowest cost, it has the possibility of a continuing cost reduction through competition of the ADPE market (20:Machabee).

Disadvantages. The prime disadvantage of using a contractor is the capability of the contractor in a wartime scenario. Under present regulations, combat and combat support forces must be capable of independence. If contractors continue to move into military activities, contractors will soon assume the role of those activities. Profit motive is the foundation of free enterprise. The Government cannot afford for the

basis of its military operation to be controlled by profit motive. This could become an unprofessed objective of military defense instead of that of the defense of the nation.

There is no reason for an enterprise to change its requirements from profit motive. On the other hand, the Government is a nonprofit organization. Consequently, the question will arise, why should the cost of operating a non-profit organization's maintenance be greater than that of one with a profit motive?

National defense is a 24 hour a day, 7 day a week activity. Contractors of automatic data processing equipment do not, ordinally, need to maintain equipment so that it is operational 100% of the time. Therefore, the cost of using contractor will increase proportionately with the availability increase. IBM uses a 39% increase for 24 hour/7 day a week maintenance (2:14).

One effect of using the contractor, would be to reduce the quality of the experience of Government maintenance personnel. Personnel, that maintain automatic data processing equipment, would have much less exposure to the latest technology. One reason for using contractors is that of rapid changing technology. Personnel that would rotate, through what has become a contractor domain, and procede to a critical, possibly wartime environment, would not have that experience.

Lastly, logistics analysis would have to be periodically performed if a contractor is selected for maintenance. "Periodic assessment will be made to determine the optimum method of support (that is, organic, contractor, or a combination thereof; AFR 26-12 applies)" (7:1). This would be necessary

to preclude the accusation of use of "sole source" contracts and to encourage contractor performance.

Interim Contractor Support

Another option to consider is Interim Contractor Support (ICS) in the early years of equipment acquisition with gradual conversion to organic. If organic maintenance is desired, but there is not enough lead time to organize organic capability, ICS is a plausible solution. This would be based on economic analysis and technical feasibility (12:4).

ICS refers to use of the contractor in the following situations:

a. The items to be supported or items of support equipment have an unstable design; moreover, the projected cost of setting up an organic capability at the time operational support is first required is excessive, either because of the uncertainties in the type and level of support required, or because of the risk that support resources will become obsolete if procured too early. For contractor support to be described as ICS in this situation, it must have been planned at least budget lead time away and have been subjected to rigorous cost and risk analyses.

b. All or part of the reources required to establish an organic capability will not be available until after operational support is first required. In this situation, the system development, production, and deployment phases do not allow enough time to develop the support resources before organic support is needed (the most common example of this situation is the sequential phasing of automatic test equipment development, which generally lags development of the system it supports.) To qualify as ICS, early planning and analysis must occur.

c. Limited organic logistics support may be set up concurrently with the use of ICS in order to validate the proposed organic logistics

program. This could be done during follow on test and evaluation using preliminary military technical data and preproduction support equipment.

Interim contractor support (ICS) is a cost effective logistics support alternative for a major system or high cost or risk Class V modification. It allows the Air Force to defer investment in all or part of the support resources (such as spares, technical data, support equipment, and training equipment) and to use contractor support while the organic capability is being phased in (8:1-3).

In the early years of consolidated ADPE program work will be at a low initial requirement. With leadtime constantly reducing ICS would be an optimum setup for the beginning with the intention of steadily moving into the organic maintenance (12:4).

Taking the initiative of beginning the maintenance program with organic maintenance would entail early procurement of depot and base maintenance capabilities. This would include facilities, technical documentation, support equipment, spares, and so on. The result would be a tremendous amount of resources vulnerable to modification or obsolescence. High technology in the computer industry leads to instability of the requirements for such resource items. Since the decision has not been made for organic or contractor support, there is the possibility of too little lead time to develop the resources discussed. Consequently, the problem is compounded by incompleteness of obsolete resources (8:3).

An analysis of the critical resources exposed to modification and obsolescence should be done to find those resources that are most affected by this problem. ICS would be the answer to gradually moving into a volatile high technology maintenance situation (8:3).

Conclusions

If cost were to be set aside for the moment, the real problem that effects the manager is the decision of whether contractor maintenance is more efficient and/or effective than organic maintenance (5: Byler). The decision of the logistics manager could result in total organic support, organic "on-site" with contract supply support, or total contract logistics support (19: Kelly).

Generally, the Air Force provides organic logistics support to an operational unit for newly introduced equipment as the first article arrives. "Organic computer maintenance and computer program development and maintenance capabilities are established where economical or to satisfy system requirements" (10:1).

So, the Air Force policy is to place organic maintenance personnel where it is most economically feasible. In IBM's debut to this policy, IBM concluded that contractor maintenance is better than organic because IBM will:

> Manage to customer's availability requirements
> [use] Predictive maintenance vs remedial maintenance
> [use] Sophisticated diagnostics
> [have] Established parts inventory management system
> [provide] Second and third level support
> [have] No obsolescence due to engineering changes
> [have] Fast response
> [have] Low turnover of personnel (2:18)

IBM further stated that the use of contractor maintenance would have the following cost avoidance items: training and training equipment; support

equipment; integrated logistics support effort; and spares inventory or warehousing (2:19).

IBM stated that they recommend contractor maintenance based on the following: "integrated product support system [is] already in place, Air Force can advance with technology improvements more readily, [IBM is] more cost effective [based on IBM's cost analysis]" (2:20).

The readers of this thesis must understand that IBM has a great deal to gain by transferring to the Government the interpretation that contractor maintenance is by far the only plausible solution to equipment maintenance.

The easy way out would be to agree. There is no organization that has a great deal to gain by pressing the advantages of organic maintenance. It is left to the logistics manager and the author to rationally determine the most effective support for ADPE.

The most effective comparison argument is that of military employees versus contractor employees during a wartime condition. The question may be asked, will there even be an IBM under extended wartime conditions? This could be a very valid argument if the maintenance material effected is truly a wartime resource. Command and control of the Space Transport System (the "shuttle"), satellites, and so on fits in a direct combat support role. AFR 26-1 states that "Direct combat support postions are positions that have tasks which, if not performed, could impair Air Force combat capability within approximately 36 hours" (13:6). Communications provided through satellites for early warning and emergency action messages would place them in this role.

AFR 26-1 calls for use of military manpower when direct combat

support is involved or indirect support is used "where it is not reasonable to rely on the probable performance of volunteer civilians" (13:6). A factor that makes government position on direct combat support unclear, is the fact that considerable contractor maintenance personnel are used in The Norad Cheyenne Mountain Complex. Therefore, part of the problem is policy or enforcement of policy.

Another consideration is that of the extreme reliability of the central processing units (CPU). Most of the ADPE maintenance problems are with peripherals such as printers, drives, plotters, communications equipment, and terminals. These are the less exotic items and lend themselves more readily to simpler maintenance capabilities. If contractor maintenance were to be minimized because of wartime requirements, but not deleted, this would be an advantageous type of maintenance for that portion performed by organic personnel (20:Machabee).

A consideration should also be made to the cost savings that could be generated by using the original equipment manufacturer for contractor maintenance. Advantages are gained in costs of information release from the the contractor for competition of the maintenance contract. AFIT recently recognized a cost advantage in the purchase of Burroughs ADPE. The CPU for several Burroughs terminals cost $5,500. That purchase is without technical data release. The other option was $41,000 for each CPU through GSA, with technical data, thus allowing competitive maintenance. Although this affects competitive contracts, an eight fold cost advantage is a definite consideration (20:Machabee).

Arguments have been given for all of the points discussed. However, the

command involved must attach a measure of importance to each of the arguments. It is left to the logistics manager to use the information provided in this thesis to establish policy on combinations of organic and contractor maintenance.

IV. Organic Personnel Acquisition

Introduction

Space Command must define its work force requirement, to achieve stated goals. By defining the work force requirement it can develop the knowledge of necessary numbers, skills, competencies, and weaknesses of the personnel involved (27: 321). This is combined with the variables such as market, process, investment, and technology to determine what personnel level is requred. Space Command would have to determine activities and effort to establish a program necessary to acquire the personnel. Once this is done the effects of the acquisition of those personnel on the Air Force must be considered (27: 322).

When a decision is made to acquire personnel several processes become involved. Recruitment, selection, and training become significant drivers of the acquisition process (27: 323).

Recruitment

The President and Congress must concur on the necessity of procurement of the required personnel. If this happens recruitment may begin. The Air Force would have to recruit people that meet a very specific need. Individuals qualified to be trained to maintain ADPE and who would be interested in making a career in the Air Force must be those that are recruited (27:332).

A source of recruitment for these people could be internal to the Air Force. However, dissecting personnel from existing job specialties has historically proven to be nearly impossible (27:332). Therefore, it would be appropriate to recruit personnel for the all volunteer force from external sources.

A realistic recruiting approach would involve providing information to the prospective recruit about all effects of the military lifestyle. Income as an enlisted maintenance type is not nearly as competitive as private industry. The recruit would have to be informed that the needs of the Air Force will be paramount to his desires as an employee. He will be expected to work in war zones and to work in remote areas. He can expect to be burdened by family separation (15:1).

Two major personnel exit surveys show "lack of job satisfaction as the major reason for exiting the Air Force" (15:1). Both polls, performed from October 1982 to March 1983, were made of personnel exiting the Air Force voluntarily. The top five reasons for airmen leaving were (from 1332 respondents):

1. More job satisfaction in civilian job (43%).
2. Higher pay in civilian job (42%).
3. Too many petty restrictions (39%).
4. More geographic stability in civilian jobs (39%).
5. Little say in future assignments (37%) (15:1).

Of the airmen surveyed, 83% were first term and 11% were second term. The remainder were careerist (15:1).

Another study performed by two Air Force researchers, based on a

survey of 4300 Air Force members and spouses, found job satisfaction directly linked to military retention. Identification of spouses with jobs of the military members are important. Researchers found that:

> Consideration could be given to more time off to be with family and to scheduling members so that the members and spouses work schedule are compatible. Family moves and TDY separations should be held to a minimum. Attention should also be directed toward improving economic security, recreation services, and medical and dental service (22:10).

Selection

The personnel that are selected for ADPE maintenance are, by job qualification, intelligent and aware. After exposure to the possible military life style and pay compensation, that type of individual may become a critical recruitment shortage.

Those that still desire military lifestyle would begin a tough electronic training school. Training of the new recruit, in most cases, will not require much analysis since most are from high school or limited college background. Therefore, training in ADPE maintenance will most likely be at the beginning level (10:3).

Training

Training will consider long and short term conditions. Long term will be for the recruit that will most likely remain in the Air Force. The training should give him basics that should be rounded enough to support his career.

The short term consideration is that of the result of a disillusionment with Air Force life and consequential non-retainability. So, short term consideration must involve acquisition and training of sufficient personnel to continue an adequate workforce, even with losses (27:344).

Training would involve development of technical, behavioral modeling, conceptual, and diagnostic skills (27:346).

Technical skills will involve classroom instruction and apprenticeship type of training situations (27:346). Most of the computers for the consolidated ADPE program are of more modern technology than presently used in the Air Force. The initial training situation would be by the Air Force on the older computers (IBM 3033) with follow on training provided in the field where the advanced computers are. If the modern computers are not purchased for a pure training environment, most likely this training would have to be continued by the contractor. Even if this were to not be the case, with the rapid change in technology that affects the computer industry, continual updating sessions would be required of the contractor.

Behavioral modeling would occur for the recruit. This involves such general military training such as driving safety, squadron and wing commander calls, aerobics, and military courtesy.

The most difficult skills of all, conceptual and diagnostic skills, are not a natural result of the military lifestyle. The conceptual and diagnostic skills are only obtained through time and experience (27:347). Losses to industry can be expected, since computer maintenance personnel are a valuable commodity in the present market environment. The result is the loss of personnel at the point in his career in which he is at the beginning

stages of conceptual and diagnostics skills acquisition. Individuals can be fed into the pipeline to replace the loss. However, the overall training result will be weak in these skills. This is one of the prime advantages of the industrial corporate memory, mentioned earlier in Chapter III, in which personnel loss (or reassignment) is lower.

Acquisition of organic personnel is dependent on two factors, availability and qualifications of those personnel. Discussion of these two factors follows.

Availability

A decision must be made either for civilian or organic ADPE maintenance. If "blue suiters" are desired there are two main problems that need overcoming. First, personnel must be recruited to meet added requirements as SPACECMD is establishing a new program with new personnel requirements. Secondly, control of retention of newly acquired recruits must be maintained.

The number of available personnel will be less within the next ten years. Specifically, there will be less 18 year old recruits available (23:2-4).

In the period 1950 to 1960 the U.S. birth rate began a gradual decline. At the turn of the decade, 1960, 4,307,000 births occured. The national rate represented by this fugure is 23.8 births per thousand of population. In 1970 the number of births were 3,739,000 yielding a rate of 15.7 per thousand (23:2-4).

To demonstrate the direction that the U.S. population growth is

developing fertility rate must be discussed. Fertility rate is the average number of live births per woman of child bearing age. Fertility rate from 1955 to 1959 was 3.69. The rate declined to 2.48 in 1970. In 1982 the rate was down to 1.88 (23:2-4).

Social factors have changed that have caused lower birth rates. Some of these factors are: families have greater control over where, when, or whether they will have children; there has been a 26% increase in employed married women from 1950 to 1980; divorce rates have increased; and abortion rates increased (23:2-4).

The results are that the age group 15 to 17 will decline by 20% from 1980 to 1990. The age group 18 to 24 will decline 14.6% in that same period.

It can be seen that the age group of most interest to the U.S. military is steadily decreasing. Consequently personnel availability is decreasing (23:10). Figure 5 shows a plot of actual data showing the trend of the percent of 17 to 20 year olds actually serving on active duty from 1960 to 1979. The data from 1973, which is the time the all-volunteer force began, until 1979 shows a definite linear negative slope. This indicates not only that the decrease in the population of that age group is in effect, but that the decrease clearly has a correlation with the military induction of that age group.

A Rand study describes a major environmental problem as the diminishing military entry age group available for recruitment. The U.S. Census Bureau projects a decrease of 18 to 21 year old males from 8.3 to 7.3 million within five years. A one million decrease is also anticipated in

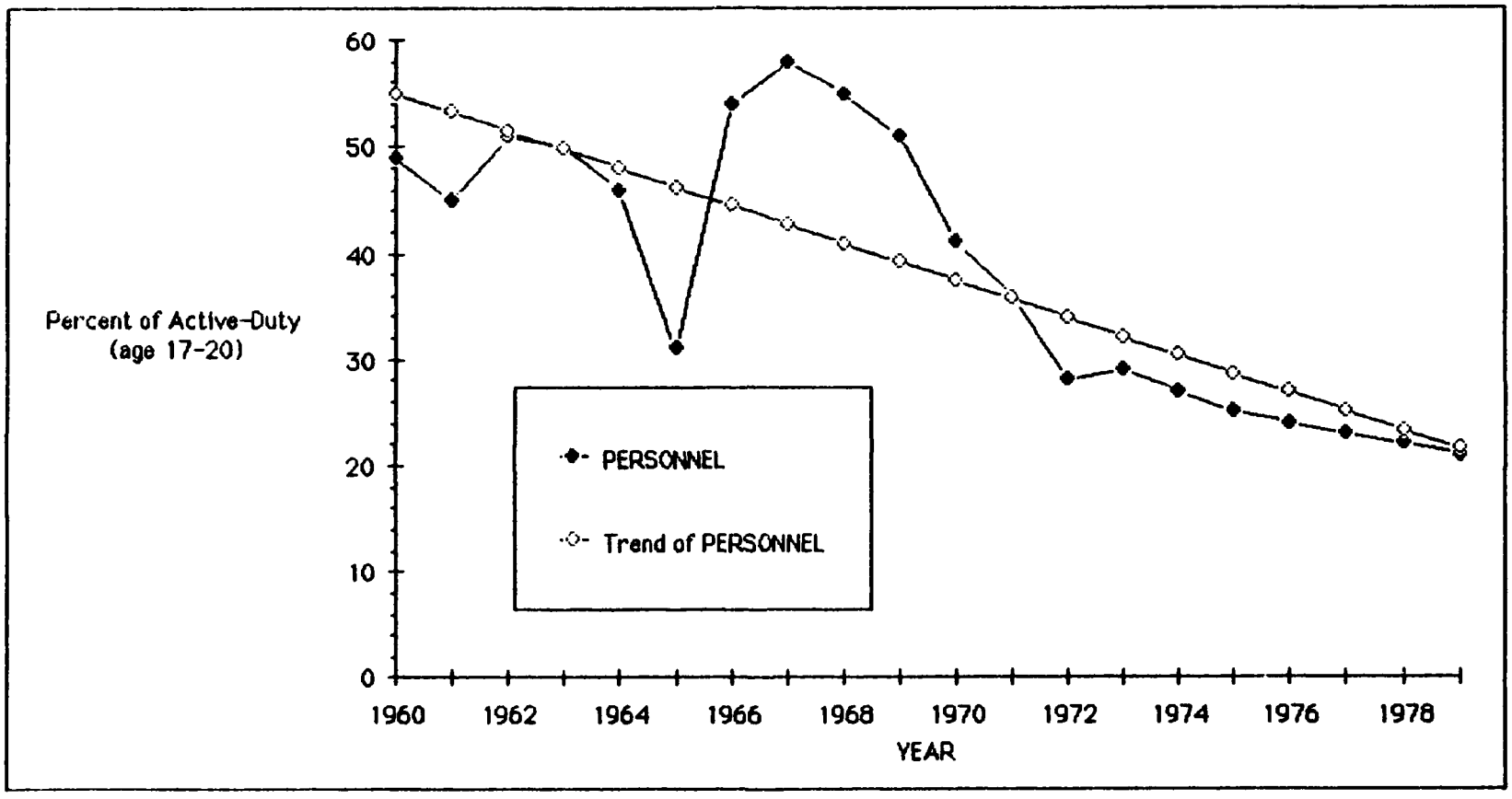


Figure 5. A.F. Active-Duty (age 17-20)

the same age category for females. Of the 1.8 million American males turning 18 between 1984 and 1988 only 748,000 per year will qualify or be available for recruitment. Furthermore, within that group the military must recruit 50% to maintain recruitment requirements. In 1991, 55% of the available 18 year olds will have to be successfully recruited to meet manpower requirements (21:3).

Acquisition of personnel is a powerful force that effects the daily operations of the Air Force and the United States military in general. Air Force Times recently interviewed Lt. Gen. Duane Cassidy, Air Force deputy chief of staff for Manpower and Personnel. He said that the Air Force is felt to be 23,000 personnel short in FY 85. The Air Force is requesting 9,400 added personnel to the FY 86 budget. Because of budget cuts there are proposals to remove *non-mission oriented personnel* which are labeled "support" and "auxiliary" from the request. The types of personnel congress would like to cut are, "involved with combat training, runway maintenance and repair, air traffic control, intelligence gathering, intelligence analysis, and satellite ground station operation" (16:22). A disapproval of the 9,400 addition would hurt retention and possibly driving manning to the manpower shortage experienced in the 1970 decade (16:22).

Brig. Gen. Mary A. Marsh, director of Manpower and Personnel with the Joint Staff under the Joint Chiefs of Staff, stated in an interview that recent pay caps are having a dramatic effect on recruiting and retention. Large pay increases about 1980 gave a positive impetus to recruiting and retention. Pay became comparable to civilian pay. In 1983 and 1984 pay caps were placed on military pay. The same is expected in 1985. The

consequence is that military pay is 10% behind the civilian sector. Higher civilian sector pay will most likely lead to the same situation that occurred in the decade following 1970. Many mid-level NCOs and officers left military service during this period (14:3).

She says that at the moment, retention is stable. However, congress continues to "whittle away" at retirement benefits, an important retention item for military personnel. Typical congressional actions are:

1. The rounding down of dollar amounts.
2. Changing the COLA raise from twice a year to once a year.
3. Ending the look-back provision for calculating retired pay.
4. Basing the retired pay on the member's highest three years of basic pay rather on pay at retirement (14:3).

A study by the Brookings Institute indicates many requirements that must be enforced for the military all voluntary force to survive todays harsh recruiting environment. For the purpose of this thesis two will be considered. Foremost in that study is a recommendation to boost financial incentives. The other major point is the specialized replacement of military people with civilians (21:3).

Mr. Martin Binkin, author of the Brookings report, states that the nation is less intent on maintaining competitive military pay (21:3). The consequence of this is reflected in the interview with Brig. Gen Marsh, in which she emphasizes the importance of competitive military pay for recruitment and retention (21:3).

Mr. Binkin states that civilians could be used to replace military

members. Twenty percent of the 300,000 military jobs do not involve combat (21:3). This makes the use of civilians in many of the military jobs a plausible solution.

Conclusions drawn in the Rand paper were that if the cuts performed on military pay in 1983 and 1984 were restored in 1986 military personnel shortage will be precluded. The insinuation here is that just the opposite will occur if the restoration does not happen (21:3).

The Brookings and the Rand study were both developed under the premise "that the military will not rapidly increase manning requirements and the economy will not dramatically improve" (21:3).

There is a heated discussion in congress on the anticipated 3% pay raise which originally was scheduled for July 1985. Senator Warren Rudman (R-N.H.), of the Senate Appropriations Subcommittee of Defense has been deeply involved in the debate. He states that avoiding the July pay raise will save $500M in FY 85 and a total of $6B thru FY 88. He discussed the anticipated personnel request, in the light of the reduction of support types of personnel. He defined support personnel as "those persons not assigned to strategic, tactical, or mobility units." In discussing personnel cuts he says that he is apalled by the fact that 30% of enlisted personnel are repairmen, not combat personnel (6:3). The basic drive of his statements is that non-combat oriented functions can be reduced and would not affect the defense capability of the military. In this way defense costs can be reduced.

All four service personnel chiefs warn of a personnel exodus if the 3% pay raise is not passed. Vice Adm. William Lawrence, deputy chief of Naval

Operations for Manpower, Personnel, and Training says "Our [pay] compatibility analysis shows a significant disparity in military and civilian pay now. It would be farther exacerbated by no raise." Lt. Gen. William Mahony, Marine Corps deputy chief of staff for Manpower, stated "Readiness is improved by retention, and retention is improved by decent pay" (16:22)

The Senate Budget Committee voted to freeze service member pay at least until October 1986. Presently, discussion is still continuing. Projections are that the House Budget Committee will uphold the freeze (16:22). There is a continuous building momentum in the growth of high technology jobs. The most obvious growth is in the field of computers. In 1982 the employment in manufacturing jobs was 19.4 million, which was about 19.5% of the labor force. Not much growth is expected in manufacturing jobs. In 1970, 785,000 people were employed in the computer field. In 1982, 1.5 million were employed in the computer field. Jobs in the computer and electronics industry are growing at a tremendous rate and jobs are going unfilled (23:19).

Future jobs created by advancing technology may be even tougher to fill. A survey by the American Electronics association in 1981, concluded that by 1985 about 670 of its associated companies will father 140,000 paraprofessional jobs (laser technicians, assemblers, engineer aides, and so on). The expansion of technical jobs will be in designing, building and maintaining industrial robots. Jobs are appearing all over in computers in insurance, education, health, and many other fields (23:26).

The results are that manpower in high technology fields, such as computers will have manpower shortages. In earlier paragraphs it has been

pointed out that the nations labor force is declining. This combined with the advancing growth of the high technology industry indicates that the shortage will exist (23:26).

Therefore, it must be pointed out that the Air Force will be in an ever more critical battle with industry for the manpower to maintain Air Force high technology equipment. Some have gone as far as to say that increasing pressure will be brought about to bring back the draft (23:26).

Qualifications

The number of qualified personnel that are interested in a military are even less than projected years ago. The effects of the pressures discussed so far and a little known norming error in DOD statistics have culminated in a new recomputation of Category IV types entering into military careers. Category IV is the lowest classification in the Armed Forces Qualification Test (AFQT) that is acceptable to the military (25:49).

In recent years, around the early part of the 1970 decade, there has been complaints by field personnel that the quality of personnel among new recruits in the field seemed to be lessening. About the time that this was occurring it was discovered "that the aptitude test taken by all recruits [throughout the U.S. Armed Forces] had been misnormed" (25:49). Figure 6 shows the accession of Category IV military personnel from 1972 to 1980. This figure has been corrected for the norming error for the period 1977 to 1980. The data which forms the basis for the chart Figure 6 was gathered from Statement of Acting Assistant Secretary of Defense on Manpower, Reserve Affairs, and Logistics, (Robert Stone), 24 February 1981. Figure 6

data is on Air Force personnel only, and clearly shows a positive trend in accession of Category IV personnel. This is true even after Congress imposed a 25% limit on Category IV accession of personnel in 1980 (25:50).

This limit has not been a problem to the present. However, the decline of available youth and the threat of reduced competitive pay, will have a critical affect on the percentage of Category IV personnel. The overall quality of accession personnel would be consequently continuing to decrease. There is a double edged sword effect to the overall results. The number of available personnel is going down and the qualifications of those personnel is also going down (25:50).

It can be safely assumed that Category IV personnel are not intentionally used for maintenance of ADPE. If Category IV percentage is increasing all other Category percentage must be decreasing. Thus, the percentage available for ADPE maintenance is decreasing.

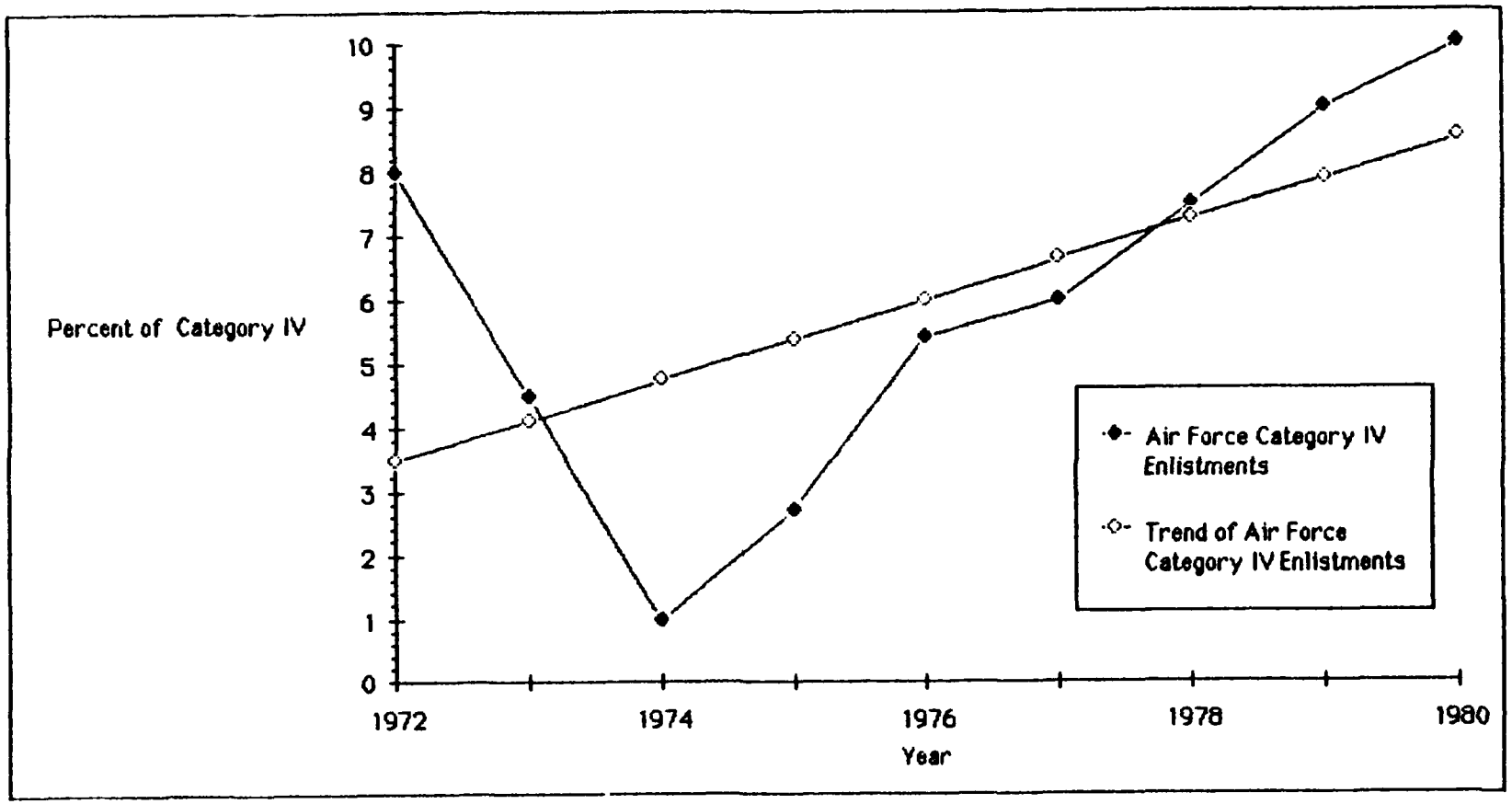


Figure 6. A.F. Category IV Enlistments

Conclusions

Acquiring organic personnel will be incredibly hard. Last year, by way of a survey, the Pentagon found that interest of service-aged males in joining the military had waned to the lowest point in the last ten years. Less than thirty percent of those interviewed thought they would probably enlist (26:5).

This chapter has shown that the overall number of available personnel for military duty is on the descent. This is a demonstrated fact, merely because those that will reach military induction age within the next ten years are alive now.

Pay compensation has been discussed by many military personnel authorities as insufficient and not competitive with civilian pay. This has been a proven deterrent to personnel acquisition.

It can be argued that young accession aged personnel are inexperienced and that industry is not interested in acquiring them. The military, on the other hand, will accept and train most anyone that can meet minimum physical and mental requirements. The lack of experience has no effect on the selection. These are facts, but the problem still arises when consideration of retention is made. After an initial tour of duty the recruit will do one of two things.

He may return to the civilian industry, because he would have the experience and qualifications. Civilian industry would provide him with his perceived job satisfaction and higher pay, as demonstrated by military personnel loss surveys.

He may be lost for at least one tour of duty to another command or

merely to another location. Since the equipment he would maintain at that location would not be of the advanced type installed in SPACECMD at Colorado Springs he would lose experience and technology advancement knowledge which he would have had. The result, even if he were to return to Colorado Springs, would be a new trainee that would be three to four years behind the technology. Another consideration is the fact that replacement for his loss during the three to four year period must be recruited. Therefore, the number of personnel to initially start the consolidated ADPE maintenance program is deceiving. In reality, looking at a ten year life cycle of the equipment, the number to be considered is double to triple because of loss to industry and loss to other Air Force facilities.

The bottom line is that acquisition of new military personnel will not be easy, if not just handicapped. Once personnel are acquired, keeping them will be a challenge that is for the most part out of Air Force control and in control of a congress that is under pressure to cut costs.

V. Conclusions and Recommendations

This thesis has presented a limited picture of a decision process to be used in deciding whether organic maintenance is better or inferior to contractor maintenance for ADPE installed in Colorado Springs for SPACECMD. Conclusions are left to the manager involved in the decision of the selection.

Chapter II presented a study assembled by Colonel Bockleman, SD/AL. This study is aimed solely at the comparison of the costs of various stages of combinations of organic and contractor maintenance. All of the data indicated an overwhelming cost savings with the use of CLS. Only one area indicated a slight advantage in another combination other than CLS (the COR/CSS for SPADOC/AIU/MCC is $90,000 lower than CLS per year). The final totals are reproduced once again for convenience. It can be seen that the nearest cost to CLS is approximately $10M more.

	ORGANIC	CON/ORG	COR/CSS	CLS
GRAND TOTALS ($Millions)	**88.01**	**68.80**	**48.81**	**38.71**

Col Bockleman attempted to keep his study conservative and used the very minimum personnel number suggested by SPACECMD. The ARINC study shows that the most significant cost is that of personnel. This suggests that in reality even more cost savings would appear through the use of CLS than is presented in his study.

Chapter III discussed advantages and disadvantages of organic and/or

contractor maintenance. Without bias, this chapter pointed out the gains and/or losses realized with the different combinations. These were drawn from interviews of concerned authorities and Air Force regulations.

Chapter IV discussed the climate of the military personnel system and the effect Congress and the demographic environment has produced. Briefly, it showed that quality personnel acquisition and retention will be a definite player in the decision to go to organic maintenance. Getting and keeping sufficient personnel to maintain a new program will be a problem. Congress and demographic forces both oppose a movement in that direction.

The indicators of this thesis are very favorable for contractor maintenance. The cost is lower and the personnel problem would be of less consequence.

The only apparent reason to reverse this decision would be to weight the personnel requirements as directly combat support oriented. If the maintenance positions are defined as such, AFR 26-1 states "Positions that have direct combat support tasks under contingency or war plans, but indirect combat support tasks in peacetime, must be identified as military essential." This sentence is discussed under the heading "When To Use Military Manpower" (13:6). If this regulation is strictly interpreted, the decision must be for organic maintenance. The policies for interpretation of such regulations must be resolved before the decision for either type of maintenance is made.

Further study can be made into four separate areas.

First, one driving factor on the selection of contractor or organic maintenance is the decision of whether SPACECMD is part of the combat

environment or not. If it is then regulations would have to be changed to reflect allowing contractors to work as part of the maintenance force. SPADOC could safely be assumed to be missile targeted, but so could New York. The decision on the consolidated ADPE maintenance being in combat or not is not too clear. An entire thesis could be based on this topic alone.

Second, a study could be generated with a survey of the attitudes and opinions of the 17 to 21 year old age category about the military lifestyle. This could be done about 1992. This is the group of greatest concern in future military personnel acquisition.

Thirdly, a study could be done on the decision process for selecting the optimum number of personnel for 24 hour a day maintenace of ADPE.

Lastly, a simulation program could be prepared that can model the consolidated ADPE program maintenance costs. With this program, numbers and types of personnel can be varied and the output would be costs. The extensiveness of this study would require an early start and a thesis partner situation. Students with simulation backgrounds would be most effective.

Bibliography

1. Adams, Greg, CSOC Logistics Manager. "Consolidated Space Operations Center Logistics Program Assessment Review." Address to AFLC. HQ AFLC, Wright-Patterson AFB, 1 February 1985.

2. Aven, Bill, Carl Napolitano, and Bruce Roth. "Maintenance of IBM Commercial Computer Hardware in the Colorado Springs Area." Presentation to the Air Force. International Business Machine Corporation, FSD-Gaithersburg, Gaithersburg MD, 6 November 1984.

3. Bockleman,Col Dave, SD/AL. "Support Options Study: IBM Commercial ADPE for Colorado Springs." Address to AFALC. HQ AFALC, Wright-Patterson AFB OH, 22 February 1985.

4. Brushaw, Charles T. and others. Handbook of Technical Writing. New York: St. Martin's Press, Inc., 1982.

5. Byler, Maj Rodney. Lecture presented in LM 5.48, Space Logistics. School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, 6 February 1985.

6. Craver, Martha Lynn. "Senator Urges Pay Freeze, Personnel Cuts," AF Times, 45: 3 (4 March 1985).

7. Department of the Air Force. Acquisition Management: Acquisition and Support Procedures for Computer Resources in Systems. AFR 800-14, II, 10: 1. Washington: HQ USAF, 26 September 1975.

8. Department of the Air Force. Acquisition Management: Interim Contractor Support for Systems and Equipment. AFR 800-21. Washington: HQ USAF, 26 September 1978.

9. Department of the Air Force. Acquisition Management: Life Cycle Cost Management Program. AFR 800-11. Washington: HQ USAF, 27 January 1984.

10. Department of the Air Force. Acquisition Management: Management of Computer Resources in Systems. AFR 800-14, I. Washington: HQ USAF, 12 September 1975.

11. Department of the Air Force. Cost Analysis: US Air Force Cost and Planning Factors. AFR 173-13. Washington : HQ USAF, 1 February 1984.

12. Department of the Air Force. Equipment Maintenance: Equipment Maintenance Policies, Objectives, and Responsibilities. AFR 66-14. Washington: HQ USAF, 15 November 1978.

13. Department of the Air Force. Manpower: Manpower Policies and Procedures Comparative Cost Analysis. AFR 26-1, I. Washington: HQ USAF, 2 October1981.

14. Garamone, Jim. "Marsh: Readiness Depends on Pay, Retirement," AF Times, 45: 3 (23 July 1984).

15. Ginovsky, John. "Job Woe Impairs Retention," AF Times, 44: 1 (14 May 1984).

16. Ginovsky, John. "Manpower Chief Hits Proposed Pay Freeze ," AF Times, 45: 1 (18 March 1985).

17. HQ Space Command/LGXP, Consolidated Logistics Support Concept for the ADCOM Intelligence Upgrade(AIU), ASAT Mission Computation Center (MCC), and Space Defense Operations Center (SPADOC). Report No. LGX-LSC-001, 5 November 1984.

18. Kelly, Capt B., SD/ALFC. "Maintenance of IBM Equipment in the Colorado Springs Area." Address to Space Command LGXP. Peterson AFB, Colorado Springs CO, 26 November 1984.

19. Kelly, Capt B., SD/ALFC. Personal interview. Wright-Patterson AFB OH, 23 January 1985.

20. Machabee, James G., Automatic Data Equipment Analyst. Personal interview. AFIT/ADRM, Wright-Patterson AFB OH, 12 April 1985.

21. Maze, Rick. "Brookings, Rand Studies Show Draft Can Be Averted," AF Times, 45: 3 (13 August 1984).

22. Maze, Rick. "Study Links Family Attitude to Retention," AF Times, 44: 10 (14 May 1984).

23. National Defense University. Human Resources and Defense Manpower. Washington: Government Printing Office, 1983.

24. Rastetter, Maj Arthur L. III. Lectures presented in LM 5.67, Logistics Systems Overview. School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, 11 June to 2 July 1984.

25. Scowcroft, Lt Gen Brent et al. Military Service in the United States. Englewood Cliffs NJ: Prentice-Hall, Inc., 1982.

26. Stewart, Jim. "All-Voluntary Military's New Weapon Against Attrition: Money," Dayton Daily News, 178: B-5 (7 April 1985).

27. Szilagyi, Andrew D. Jr. Management and Performance. Glenview IL: Scott, Foresman and Company, 1984.

28. 84-61. GPS Operational Control System Life Cycle Cost Study: Government Maintenance Concept. ARINC Research Corporation, Santa Ana CA, 7 November 1984.

VITA

Major Robert E. Childress, Jr. was born in 1946, in Hattiesburg, Mississippi. He attended the University of Illinois from which he received the degree of Bachelor of Science in Electrical Engineering in 1969. From 1970 to 1971 he was an Air Traffic Controller at Eglin AFB, Florida. Then, in 1972, he attended navigator training at Mather AFB, California and navigator bombardier training at Mather AFB and Castle AFB, California. From 1974 to 1977, he was a B-52H Instructor Navigator and Radar Navigator at Kincheloe AFB, Michigan. While there, he also received the degree of Master of Science in Industrial Management from Central Michigan University. His next assignment was RAF Lakenheath, England, from 1977 to 1980, where he served as an Emergency Actions Officer for USAFE and NATO. From 1980 to 1984 he was a (B-52D and B-52H) Instructor Radar Navigator and Standardization and Evaluation Instructor Radar Navigator at Carswell AFB, Texas. While there, he also evaluated the new B-52D Digital Bombing and Navigation System (computer) in high level bombing, was squadron OPR for the nuclear security Human Reliability Program, and was an instructor in the operation of three different bombing and navigation computers. He entered the School of Systems and Logistics, Air Force Institute of Technology, in June 1984.

Permanent address: 7 Elliot Drive
Pleasant Hill, California 94523

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

AD-A163 307

REPO DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION: UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT: Approved for public release; distribution unlimited.
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S): AFIT/GLM/LSM/85S-13	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION: School of Systems and Logistics; 6b. OFFICE SYMBOL (If applicable): AFIT/LSM	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State and ZIP Code): Air Force Institute of Technology, Wright Patterson AFB, Ohio 45433	7b. ADDRESS (City, State and ZIP Code)
8a. NAME OF FUNDING/SPONSORING ORGANIZATION; 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State and ZIP Code)	10. SOURCE OF FUNDING NOS. — PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT NO.
11. TITLE (Include Security Classification): See Box 19	
12. PERSONAL AUTHOR(S): Robert E. Childress, Jr., B.S., M.S., Major, USAF	
13a. TYPE OF REPORT: MS Thesis; 13b. TIME COVERED: FROM _____ TO _____; 14. DATE OF REPORT (Yr., Mo., Day): 1985 September; 15. PAGE COUNT: 82	
16. SUPPLEMENTARY NOTATION	

17. COSATI CODES		
FIELD	GROUP	SUB. GR.
09	02	05

18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number): Organic Maintenance, Computer Personnel, Maintenance Personnel, Digital Computers.

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

Title: CONTRACTOR VS ORGANIC MAINTENANCE FOR SPACE COMMAND AUTOMATIC DATA PROCESSING EQUIPMENT

Thesis Advisor: Rodney C. Byler, Major, USAF

Approved for public release: IAW AFR 190-1
LYNN E. WOLAVER
Dean for Research and Professional Development
Air Force Institute of Technology (ATC)
Wright-Patterson AFB OH 45433

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT: UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS ☐	21. ABSTRACT SECURITY CLASSIFICATION: UNCLASSIFIED
22a. NAME OF RESPONSIBLE INDIVIDUAL: Rodney C. Byler, Major, USAF	22b. TELEPHONE NUMBER (Include Area Code): 513-255-5023 — 22c. OFFICE SYMBOL: AFIT/LSM

DD FORM 1473, 83 APR — EDITION OF 1 JAN 73 IS OBSOLETE.

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

The primary purpose of this thesis is to provide the manager with considerations to be taken when making the decision whether to use civilian contractor or organic maintenance for off the shelf automatic data processing equipment. It is, specifically, designed around the equipment that is being installed for Space Command at The Norad Cheyenne Mountain Complex, Peterson AFB, and Falcon AFS in Colorado Springs, Colorado.

This thesis uses studies that have been done forecasting costs to provide information on one of the primary drivers of the decision to select a specific type of maintainence. In today's environment, cost has a tremendous effect on all governmental decisions. President Reagan is attempting to protect the military budget from cuts; however, military costs must be controlled. Consequently, cost discussion is the most significant issue in the thesis.

Cost consequences are signigicant, however, the most effective use of resources and accomplishment of the mission should be uppermost in the military manager's decision. Therefore, the thesis discusses advantages and disadvantages of organic and contractor maintenance. Also, a discussion of the acquisition of military personnel is included, should the decision be made to provide organic maintenance.

The conclusions drawn throughout the aspects discussed in the thesis are highly favorable toward contractor maintenance. Primarily, because costs are lower and personnel problems are less.

END

FILMED

1-86

DTIC